

## Imaging the Acute Abdomen Objectives

- Definition
- Clinical Evaluation
- Radiologic Evaluation
  - Appendicitis
  - Pancreatitis
  - Infectious colitis
  - Bowel perforation

## Definition

- Acute Abdomen
  - Abdominal pain that persists for more than a few hours
  - Abdominal tenderness
  - Evidence of inflammatory reaction or visceral dysfunction

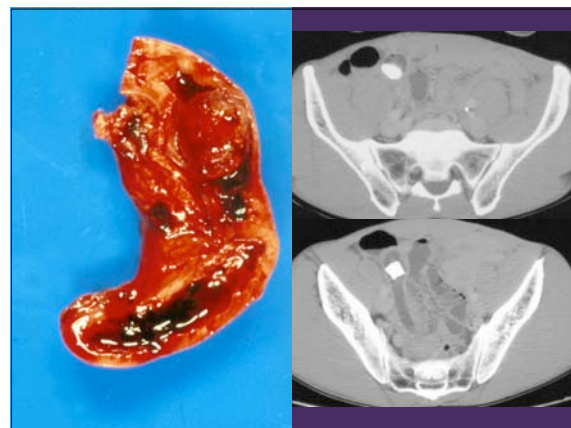
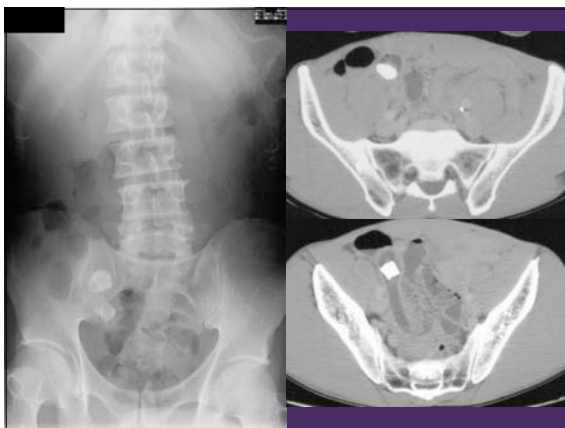
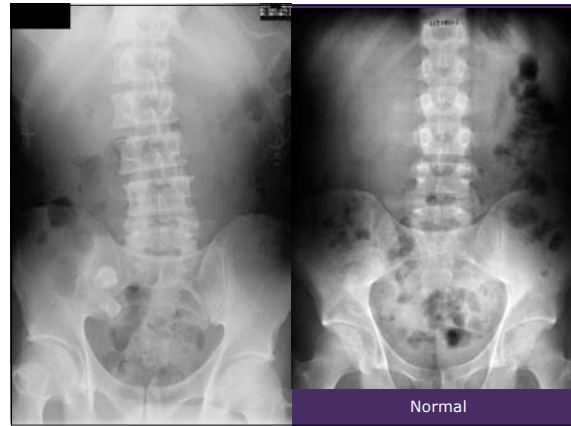
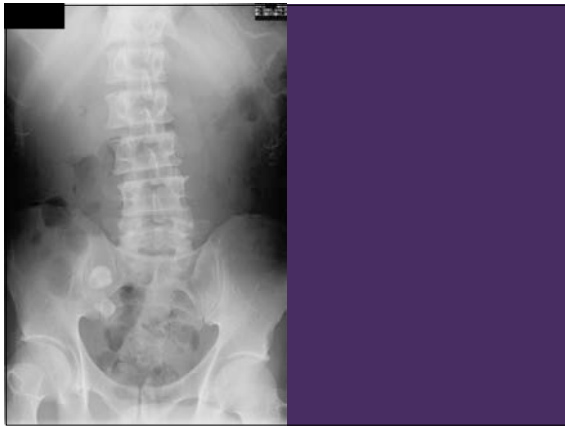
## Acute Abdomen

- History
  - Past medical history
  - History of the present illness
- Physical examination
  - Pelvic examination in females
- Laboratory examination
- Radiologic evaluation

## Radiologic Evaluation

- Abdominal Radiographs
  - Supine (KUB) and upright abdominal films
- Ultrasound
- Computed Tomography

55-old-man with right lower quadrant pain,  
fever, malaise, and poor appetite



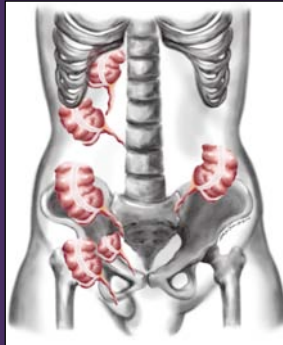
## Acute Appendicitis

## Acute Appendicitis

- Most common surgical emergency
- Peak incidence second and third decades of life
- Complications
  - Perforation 20%
  - Abscess/phlegmon 5%
  - Septic thrombophlebitis (rare)

## Normal Appendix

- Posteromedial cecum
  - Convergence of the taenia coli
- Variable position
- Variable length
  - 8 to 10 cm



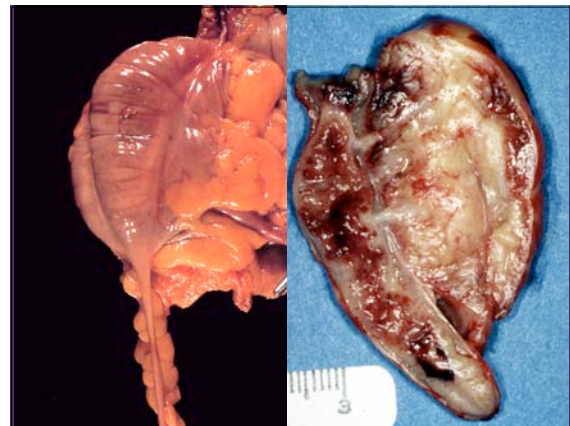
## Normal Appendix

- Posteromedial cecum
  - Convergence of the taenia coli



## Acute Appendicitis

- Pathogenesis: luminal obstruction
  - Stones, food, mucus, adhesions, mucosal edema, parasites, tumors, endometriosis, foreign objects, lymphoid hyperplasia
- Appendicolith
  - 7-12% adults
  - 50% children



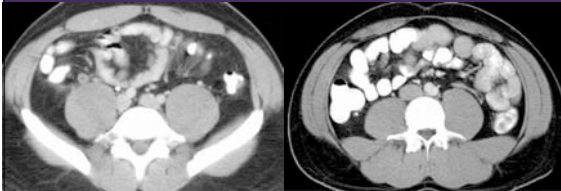
## Why Order Imaging Studies?

- Confusing clinical picture
- Pregnancy
  - Ultrasound is modality of choice
- Older age patient
  - Suspect neoplasm as etiology
- Suspected complication
  - Alter operative management

## Appendicitis Computed Tomography



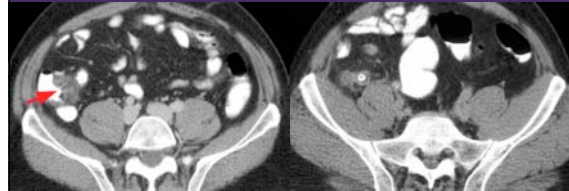
### Appendicitis Computed Tomography



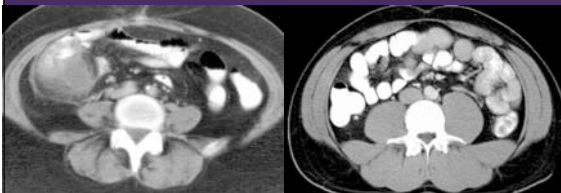
Appendicitis

Normal

### Appendicitis “Arrowhead Sign”



### Appendiceal Abscess



Normal

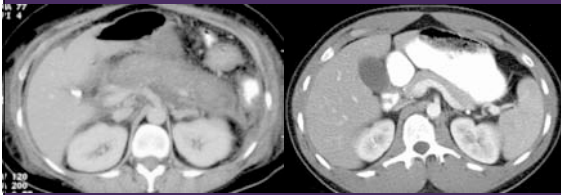
### Differential Diagnosis RLQ Pain

- Appendicitis
- Inflammatory bowel disease
- Right-sided diverticulitis
  - Ileal, cecal
- Complications of GI tumors
  - Intussusception
  - Perforation
  - Obstruction
- Meckel's diverticulitis
- Small bowel obstruction
- Epiploic appendagitis
- PID
- Complications of ovarian cysts
  - Hemorrhage
  - Rupture
  - Torsion
- Ectopic pregnancy
- Ureteral obstruction
  - Stones, tumors, inflammatory disease
- Mesenteric adenitis
- Omental infarction
- Peritoneal carcinomatosis
- Peritonitis/abscess

35-year-old male who complained of abdominal pain and collapsed

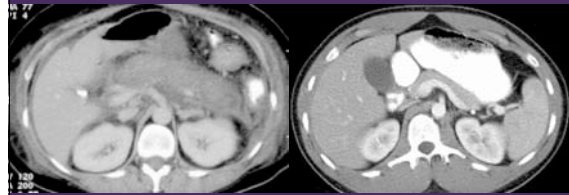
Clinical Evaluation  
Abdominal Tenderness, Elevated Serum Amylase and Lipase

35-year-old male who complained of abdominal pain and collapsed



Normal

## Acute Pancreatitis



Normal

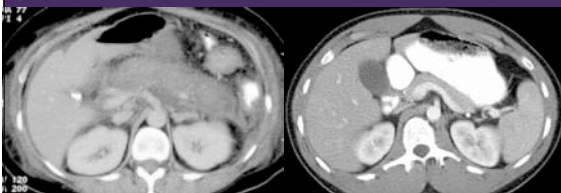
## Normal Pancreas



## Normal Pancreas



## Acute Pancreatitis



Normal

## Acute Pancreatitis

- Metabolic
  - Alcohol, hyperlipidemia, hypercalcemia, hereditary pancreatitis, kwashiorkor
- Mechanical
  - Gallstones, post-operative, trauma, duct anomalies, iatrogenic, neoplasm, gastric ulcers
- Vascular
  - Vasculitis, atherosclerotic embolism
- Drugs
  - Steroids, aspirin, sulfonamides, tetracycline, opiates, cholinergics
- Infection
  - Mumps, measles, HIV, CMV

## Acute Pancreatitis

- Clinical
  - Abdominal pain, nausea, vomiting, abdominal distension, shock
  - Flank ecchymosis (Grey Turner's sign), periumbilical hematoma (Cullen's sign)
- Laboratory Evaluation
  - Amylase, lipase
- Radiologic Evaluation

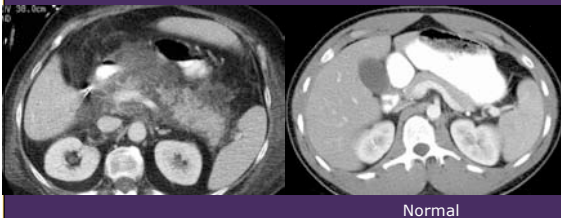


## Why Order Imaging Studies?

- Confirm clinical diagnosis
- Evaluate the etiology of pancreatitis
- Evaluate extent of pancreatic injury and inflammation
- Evaluate for complications
  - Pseudocyst, abscess, intestinal obstruction, vascular complication
- Exclude other abdominal disorders that may mimic pancreatitis



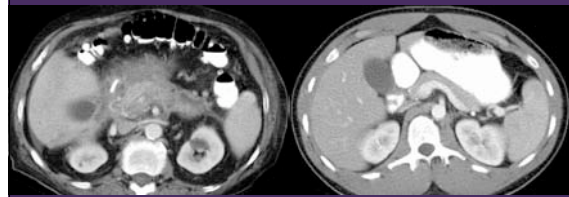
## Acute Pancreatitis with Peripancreatic Fluid



Normal

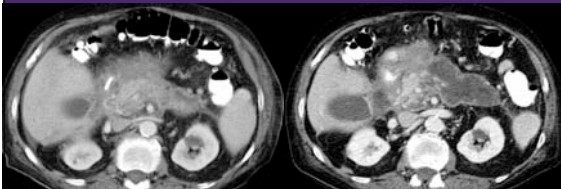


## Acute Pancreatitis



Normal

## Acute Pancreatitis with Pseudocyst



9-year-old female with abdominal pain, vomiting, diarrhea, and abdominal distension





### E.Coli O157:H7 Colitis



### Inflammatory Conditions of the Colon

- Clinical
  - Diarrhea, nausea, vomiting, fever, malaise
- Laboratory evaluation
  - Stool culture, WBC count
- Radiologic evaluation
  - Abdominal radiographs, computed tomography

### Inflammatory Conditions of the Colon

- Bacterial Infections
  - Salmonella, shigella, campylobacter, yersinia, E. coli, tuberculosis, actinomycosis
- Viral Infections
  - CMV
- Parasitic Infections
  - Amebiasis, schistosomiasis, trichuriasis
- Fungal Infections
  - Histoplasmosis, mucormycosis
- Noninfectious colitis
  - Ulcerative colitis, Crohn's disease, ischemia
- Exogenous Causes
  - Radiation, drug-induced, pseudomembranous colitis

### Why Order Imaging Studies?

- Exclude other intra-abdominal processes
- Evaluate for complications
  - Toxic megacolon
  - Pneumatosis
  - Perforation
  - Abscess formation



## Toxic Megacolon

- Inflammation
  - Transmural
  - Serosal
- Vasculitis
- Destruction of neural plexuses
- Disintegration of normal tissue cohesiveness
  - "Wet tissue paper"



## Toxic Megacolon



Normal Colon

Toxic Megacolon

## Toxic Megacolon

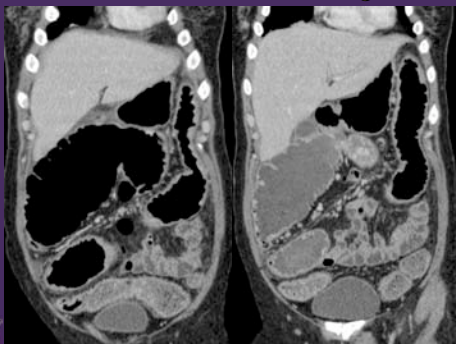
- Correct clinical setting
- Diagnosis by abdominal radiograph
  - Transverse colon
  - Dilatation >5cm
  - Colonic wall thickening
  - Loss of haustral pattern
  - Fluid levels
  - Ileus



## Ulcerative Colitis with Toxic Megacolon

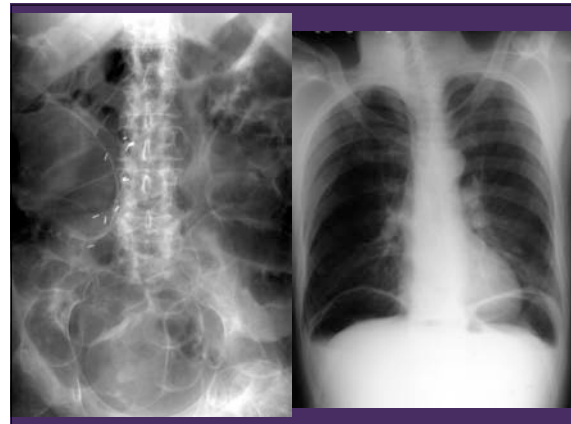
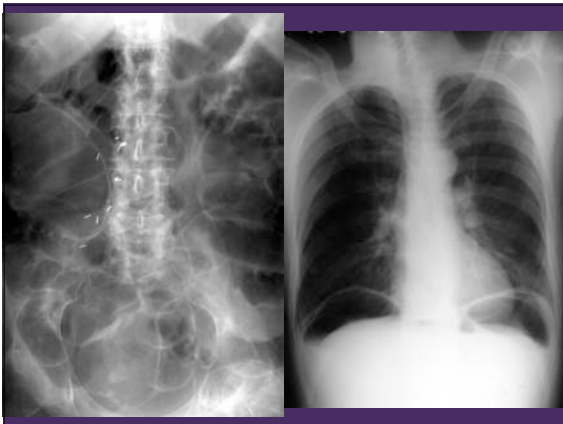
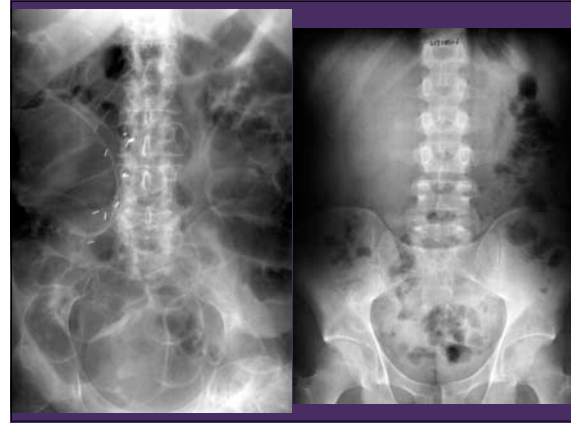


## Ulcerative Colitis with Toxic Megacolon



65-year-old female with abdominal pain and rigidity of the abdominal wall





## Pneumoperitoneum



## Intestinal Perforation

- Gastric or duodenal ulcer
- Intestinal obstruction
  - Adhesions
  - Neoplasm
  - Inflammation
- Tumor
- Severe inflammation
  - Diverticulitis, appendicitis
- Severe colitis
  - Ischemia, infection, ulcerative colitis



## Summary

- Clinical signs and symptoms of an acute abdomen
  - Pain, collapse, vomiting, muscular rigidity, abdominal distension
- Why order radiological studies?
- Common disorders causing an acute abdomen
  - Appendicitis, pancreatitis, severe gastroenteritis/colitis, intestinal perforation

